SPECIAL REPORT

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Future directions for veterinary medicine

This study examines veterinary medicine and veterinary medical educational institutions in the U.S. as they exist today. It looks carefully at the relevant social, economic and technological environment in which veterinary medicine functions and how it is changing. A careful assessment is made of the ways that this profession serves the needs of people, and those functions in which it has a comparative advantage over other disciplines, professions, and businesses, are identified. Considering these factors, it attempts to identify the directions of change that must be made if veterinary medicine is to meet the needs of society in the years ahead. Finally, it identifies directions for change needed in veterinary medical education programs to equip the profession to serve the needs of society in the 21st century.

The role of the veterinary medical profession in society

Veterinary medicine is a unique and important health profession. It contributes to human health, welfare and well-being and the quality of human life through the enhancement of health, utility, and productivity of all kinds of vertebrate animals. It protects people from risks associated with animals and animal products, contributes to the generation of new biological and medical knowledge, protects the quality of the environment, and assists in the preservation of genetic resources. Serving the needs of both animals and people it is the most diverse and widely encompassing of all the health professions.

A building crisis

Veterinary medicine's ability to serve the needs of society has been well demonstrated in a long and distinguished history in which it has made many monumental contributions to the welfare of people. Veterinary medical institutions have made phenomenal progress in the last four decades and have matured into important contributors to higher education in the U.S. and Canada. In too many instances, however, both the profession and veterinary medical educational institutions are responding to internal signals, i.e., needs of the profession and of the institutions themselves. This is a serious error. These institutions must put in place strategies and practices that will provide information on changing needs emanating from society in general, and specifically those sectors served by veterinary medicine.

Veterinary medicine is being threatened as never before by powerful forces of change in society, by rapid advances in science and technology, and by the changing needs and expectations of almost every constituency it serves. Decisive steps must be taken at this time to make corrections in the way that the profession is trying to fulfill its responsibilities, to bring them more in line with the changing needs of society. Although it cannot yet be defined as a crisis, the veterinary profession is not adapting rapidly enough to changing needs and is encountering substantial problems. Most importantly, veterinary medical educational institutions, although attempting to modify their programs and to improve their teaching, research, and service efforts, are too slow in responding, and in too many instances, are not truly aware of how out-of-step veterinary education has become in regard to the needs of the profession and of the various constituencies it serves.

Environmental changes

People's attitudes about animals, their care, and welfare are changing. Animals are becoming more than mere chattels, and society expects that they be treated humanely and receive proper care. Society's expectations as to the quality of health care animals should routinely receive is escalating with a growing proportion of the population believing that animals deserve health care equal to what people receive. Companion animal numbers, particularly cats, birds, aquarium animals, and rodents, are increasing. All these factors point to increasing demands for higher quality veterinary services, including services to the newer kinds of companion animals.

Very important demographic changes are occurring in the U.S. which profoundly affect the nature of companion animal practice, and increase the demand for high quality services for at least 20 years. The amount of money people are willing to spend for pet health maintenance is increasing significantly. Expenditures for veterinary services increased 183% in the last five years. The age group between 34 and 59 years is the most rapidly growing segment of the U.S. population. This age group has the highest income, owns the most pets, and spends the most for veterinary services of any population group.

Livestock production, like all of agriculture, is undergoing marked and pervasive structural changes which will profoundly change animal production prac-

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tices and the kinds of veterinary services required by the livestock industries. These industries desperately need veterinarians who can provide unbiased advice and services in the interconnected domain of production and health, with decreasing need for veterinarians equipped only to address disease problems. Food safety problems have assumed important proportions because of changed livestock production, animal health maintenance, food processing, and marketing practices. Veterinary colleges have decreased their efforts, or opted out of food safety programs, at the very time such programs are most needed.

Changes in the number and composition of people of college age will dramatically affect the numbers and the ethnic and racial characteristics of prospective veterinary students in the years ahead. The number of 18- to 24-year-olds will decrease from the present 30 million to 20 million in 20 years. At that time, between five and six million of these 18- to 24-year-olds will belong to minority ethnic, cultural and racial groups underrepresented in the profession. Veterinary colleges will need to mount aggressive recruitment efforts to the secondary school level in order to attract their share of minorities. Failure to do so will leave the mostly white veterinary profession both short of prospective students and at odds with the pluralistic multiracial society of the future.

Spectacular advances are being made in science and technology that promise to have a major impact on veterinary medicine in the years ahead. New and improved animal health technology, genetic alterations of animals, and embryo manipulation all will profoundly affect veterinary practice in the future. Advances in microelectronics and computers will alter ways veterinary medicine interfaces with the large and growing body of knowledge relevant to animal health. These advances will change teaching, veterinary practice, practice management, and the effectiveness of the animal health delivery system. Biological, medical, and veterinary information is increasing at a rapid rate, creating new challenges for veterinary education and making the practice of veterinary medicine increasingly complex.

World food/population relationships and important animal disease constraints to agricultural productivity provide opportunities to assist the developing world, especially in Africa. Disease patterns in the U.S. among livestock and companion animals are changing in ways that will alter animal health needs in the future. Instead of infectious diseases, which largely are being controlled, chronic and endemic diseases, many with environmental, genetic, nutritional, or geriatric etiologies are the most important disease problems. At the same time, animal owners desire more assistance from veterinarians with the care, feeding, housing, behavior, and use of animals, in addition to services directed to the prevention and treatment of diseases.

The gender composition of the veterinary profession is changing. In 1930, there were 30 women veterinarians in the U.S. In 1986, 16% of all active veterinarians in the U.S. were women. In 1988, 55% of all U.S. veterinary students were female. The total effect that this gender change will have on the profession in the long term is as yet uncertain. Fewer college age students are interested in careers in the health profession, opting instead for careers such as business in which income and status are expected to be higher. Veterinary recruitment will continue to be adversely affected by the belief that there is a surplus of veterinarians. Governmental regulations, a growing corporate influence, changing expectations of new recruits to the profession, changing expectations of employers of veterinarians, changes in the work ethic, and other such factors all will influence veterinary medicine in the future.

New directions for veterinary medicine

Veterinary medicine must make profound and fundamental changes in the way it functions, if it is to effectively cope with the changes occurring in its environment. In most facets of the profession, a few perceptive and entrepreneurial veterinarians are responding effectively to these changes and are showing the way for the rest of the profession. The veterinary profession is well along in the process of evolution from a profession composed of generalists who are expected to minister to the clinical needs of any and all animals and to function in all other facets of veterinary medicine, to one composed of practitioners skilled to a much greater depth of competence and understanding of both health and diseases in a class of animals or a species, and a cadre of highly skilled specialists who provide many other veterinary services in both the public and private sectors. Veterinary practice in the future will be much more precise, predictable, and effective as a result of more knowledge about biology and diseases of animals, improved animal health technology, improved animal health strategies, and the demands of users of veterinary services. Increasingly, veterinarians will limit their professional activities to a class of animals or species, and a larger number will provide discipline-oriented specialized services. Veterinary practitioners will serve as important sources of information on care, husbandry, and health of all kinds of animals as well as on the prevention and control of diseases. The structure of veterinary practice will be changed to better use new technology, to improve management, to increase the efficiency of the animal health delivery system, and to improve the overall quality of veterinary services. Animal health and disease research will become more important to the public and the profession, and will be given a higher priority by individual veterinarians. Public sector veterinarians will bring strong scientific and technical competency to public disease control and to public health agencies which increasingly will function as information intensive agencies. Skills in epidemiology, economics, sociology, information management, risk assessment, public policy, legal concepts, and in other biological, medical, and social science disciplines also will be required by many of these veterinarians.

Expand veterinary research

The animal population of the U.S. is an important national resource and serves the needs of people in unique and important ways. Support of research on the biology, health, and diseases of most animal species

Summary of recommended future directions for veterinary medicine

1. Change the focus of the veterinary medical profession from animal disease to animal health in all its dimensions.
2. Abandon the unrealistic concept of the universal veterinarian who can minister to the health needs of all creatures great and small.
3. Restructure veterinary practice to better serve the needs of society and the veterinary profession in the future.
4. Make research a higher priority for individual veterinarians, the veterinary medical profession, and for veterinary medical colleges.
5. Establish a more rational system of funding for veterinary medical research.
6. Improve the quality of veterinary services delivered to all species of animals in response to the escalating expectations of the public as to the health care of all of the animals important to people.
7. Strengthen the general education of veterinarians.
8. Focus the professional education process and the practice of veterinary medicine on the ability to find and use information rather than the accumulation of facts.
9. Strengthen the basic biological science content of the veterinary medical curriculum.
10. Make the achievement of educational, experiential, and cultural, racial and ethnic diversity among veterinarians a goal of veterinary education.
11. Reorient clinical veterinary education to enable a student to elect in-depth instruction and clinical experience with a practice theme (class of animals or a single species), rather than require all students to obtain clinical experience with numerous species.
12. Change the emphasis in the veterinary curriculum from almost total concentration on clinical practice to include important public sector needs for veterinarians.
13. Move toward a national perspective or strategy of veterinary medical education.

other than man has been seriously neglected. Research in the plant sciences and on human health has received the lion's share of federal support with only trivial quantities of money going to research on the biology, care, and diseases of the many animal species so important to human health, well-being, and the quality of human life. The only federal source of funding for animal research now is the Department of Agriculture which funds livestock research of economic importance to agriculture. This support is minuscule when compared to the importance of animals to the economy, the $14 billion annual losses from diseases sustained by the food animal industries, and the growing importance of food safety. Today, the National Institutes of Health (NIH) does not support basic research on animal biology and does not provide funding for research on animal diseases unless the individual research project can be seen in the review process as contributing directly to human health. Companion animal, laboratory animal, zoo animal and wildlife health and disease research funding must come largely from private donations. Funding of this research has been grossly inadequate, considering the health problems of these species, their importance to human welfare, ecology, and the scientific opportunities afforded. There are important opportunity costs to society which result from neglecting support of research on these animals.

Research on animal diseases not only has contributed importantly to animal and human welfare, but also has been an important source of fundamental biological and medical knowledge. Research on veterinary problems frequently has unexpected relationships to human health and stimulates important advances in human medicine. Sometimes knowledge of animal disease or disease agents is critical to understanding of human health problems. For example, animal retrovirus research seemed for many years to be relevant only

to animal health, but suddenly AIDS appeared as the first important disease of people caused by retrovirus. The understanding of AIDS and its causative agent benefited immensely from the large amount of information already known about animal retroviruses. There are hundreds of other examples of the unitary nature of medical science and the folly of too narrow compartmentalization of medical research into human and veterinary categories. A case is made in this report that the mission of the NIH should be interpreted or broadened to again permit support of high quality animal disease research projects as was the case in the early years of the NIH.

New directions for veterinary medical education

Significant changes will be required in the educational processes to prepare veterinarians for the future. The college level general education of prospective veterinarians must be strengthened. The focus of the professional education must be redirected from excessive emphasis on the accumulation of information to the acquisition of skills on how to find and use information, on problem solving, and on the behaviors and attitudes essential to success as a veterinarian. There is need to increase the diversity of students admitted to veterinary colleges. Attention must be given to making the professional education experience more supportive of student's individual psychological needs than currently is the case. The basic biological sciences in the veterinary curriculum must be strengthened. The achievement of diversity among graduates must be a goal of veterinary education. The clinical component of the curriculum should be reoriented to provide an opportunity for in-depth clinical instruction and experience with a class of animals or a species rather than requiring all students to have clinical experience with all kinds of animals. The veterinary curriculum must be constructed to provide for important public sector needs as well as for the needs of clinical practice. Much more emphasis must be placed on post-DVM education programs by veterinary colleges in general. Post DVM programs to prepare veterinarians for the many public sector positions are very badly needed.

Toward the veterinary medical college of the future

Veterinary medical colleges in the future will be very different from colleges today. They will be required to be more directly involved in the affairs of the state and region than currently is the case. They will manage more of the animal health and disease related information intensive services of public agencies, thus expanding their service roles. The obligations of veterinary medical teaching hospitals to provide nearly the only tertiary level of veterinary services available to the public, also will be expanded as the profession grows in competency and sophistication. Some colleges will develop referral teaching hospitals in metropolitan centers while others will develop food animal centers in areas of concentrated livestock production. Because these expanded veterinary medical teaching hospitals will become less relevant to veterinary clinical teaching programs, veterinary students will obtain a greater proportion of their clinical experience in private practice settings. The research function of veterinary medical colleges will be significantly expanded, and the research will become more fundamental in nature with practicing veterinarians conducting more of the applied research. Veterinary education programs will capitalize upon these developments and will use the expanded research and service activities more extensively than they currently do in teaching programs. Colleges will become learning as contrasted to teaching institutions, and students will be given more responsibility for their educations. Student time will be divided between self-learning, didactics, and assisting faculty with the research and service missions of the college. Veterinary practitioners will contribute to the education programs much more than they currently do, both in their practices and at the veterinary medical college. Problem solving skills, behaviors, and attitudes of competent veterinarians will be learned from faculty mentors as students and faculty go about the work of these expanded veterinary medical centers.

Veterinary colleges must find ways to bring high quality animal science instruction back into its teaching, research, and service programs by developing close ties with, jointly sponsoring, or as a last resort establishing programs of animal science in the veterinary school. Electronic information centers that manage information banks relevant to animal production, health, and diseases are destined to become a central focus of teaching/learning in veterinary college. Veterinary colleges must expand their interactions with the rest of the university in order to maintain currency and competency in modern biology and the quality of graduate education and research programs. A veterinary college, in turn, has much to offer other campus academic units. No veterinary college can maintain programs of quality in all important areas, specialties, and disciplines because the educational mission in veterinary medicine has become too large. Colleges must focus their programs, concentrate their resources, and engage in fewer kinds of activities in order to achieve the level of excellence expected of the profession by society. A veterinary college should develop special clinical, teaching, and research centers (centers of excellence) in areas in which it has a comparative advantage over other veterinary colleges in the availability of clinical materials, or in other relevant areas. Working together, veterinary colleges in the U.S. and Canada can develop the needed strong programs in all essential areas of veterinary medicine. If every college tries to cover all or many areas on their own with little concern about what other veterinary colleges are doing, many areas of important public need will continue to go unfulfilled and too many weak programs will be continued. The development of a national perspective and strategy for veterinary education is a way that veterinary medicine can develop the high quality programs in all facets of veterinary medicine that are so important to its ability to provide for society's needs and to the future of the profession. The management of veterinary medical institutions in the 21st century will be a challenging and

demanding job that will require special management training. There is a need to institutionalize periodic review of veterinary education in the U.S.

Veterinary work force

Veterinary work force studies reveal that the enrollment in the professional veterinary curriculum should be reduced. Some veterinary colleges, suffering from shortfalls in support, should use released funds to strengthen their programs. In others schools reallocations made possible by reductions in professional enrollments could be used to help fund post-DVM programs in dire need of expansion. Reasonable reductions in DVM output would not adversely affect the supply of practicing professionals in the U.S.

An opportunity for veterinary medicine

Important challenges face veterinary medicine as it moves into the 21st century. Most of these challenges also provide opportunities for the profession to improve the quality, effectiveness, and usefulness of its services to society. The opportunity exists at this time for veterinary medicine to make very significant progress in its development as a unique and important health profession. Recognizing this fact, veterinary leaders are developing strategies that address the changing needs of the profession and that will place it in a strong position as it moves toward the 21st century.